DESIGNING INTEGRATIVE ASSESSMENT TO ENHANCE STUDENT LEARNING FOR THEIR FUTURE

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Abstract

As many universities have recently undergone curriculum review and renewals to better prepare students for their work and life in the changing world, renewed interests are being directed to what students should learn and how that learning can be best supported. In recent research, learning has been reconceptualised as processes where learners integrate what they know and are able to do with who they are becoming within a broad range of practices. This type of learning shifts the focus of education from the development of a particular curriculum to the development of the whole person. It plays a heightened emphasis on students developing appropriate ways of being, including being with others and things, and thus has potential in preparing them for future work and life. In line with this reconceptualisation of learning, the paper will explore ways in which assessment can be designed to promote learning to become who students endeavor to be in higher education programs. Designing assessment for this purpose underlines the need to integrate assessment with real-world practice, assessment with the learning students are engaged in, and the formative with summative purposes of assessment. Appropriate strategies for ensuring integration will also be discussed in reference with the research literature.

Introduction

As many Australian universities undergo curriculum review and renewal, renewed attention is being directed to enhancement of student learning in preparation for the changing world. In the international education arena, what constitutes quality learning and how student learning can be best supported has been widely debated (for example, see Barnett, 2010; Chalmers, 2011; Cranton, 2011; Dall'Alba, 2009, 2012; Kreber, 2007; Murray, 2009; Shulman, 2011; Trigwell & Shale, 2004; Vardi, 2011). Along with debates on learning and learning enhancement, the notion of knowledge as a fixed body, ready for transfer and acquisition, has been challenged (for example, see Brew, 1999; Brown, Collins & Duguid, 1989; Dall'Alba, 2004, 2005, 2009; Dall'Alba & Barnacle, 2005, 2007). Rather, knowledge is interdependent with the context of use and the knowing subject or 'knower'; we are constantly in the process of negotiating and making sense of knowledge (Dall'Alba & Barnacle, 2007). In other words, knowledge is "created, embodied and enacted" in and through lived experience (Dall'Alba, 2005, p. 365, see also Dall'Alba, 2009; Dall'Alba & Barnacle, 2007; Dall'Alba & Sandberg, 2006). Within this conceptualisation of knowledge, learning as simple transfer and acquisition of knowledge is inadequate.

Efforts in higher education to extend beyond knowledge transfer and acquisition are not new. These efforts include promotion of life-long learning (for example, see Boud & Falchikov, 2007), the incorporation of generic or employability skills (for example, see Barrie, 2007; Cumming, 2010; Greene & Saridakis, 2008), the introduction of KSA (knowledge, skill and attitude) model (for example, see Noe, 1986; Tesluk & Jacobs, 1998) and practice-driven curricula (for example, see Boud, 2009; MacLeod & Farrell, 1994; Morris, 2008; Schwandt, 2005; Stigmar, 2010).While these efforts recognise that learning for a changing world needs to extend beyond knowledge transfer and acquisition, they seem to focus on the development of a particular curriculum or type of professionals. An associated risk is deflection of attention from learners and the learning that takes place. They overlook the need to "engage the whole person: what they know, how they act and who they are" (Dall'Alba & Barnacle, 2007, p. 691).

Given that "the knowledge we pursue, uncover and embody" shapes who we are and what we do (Thomson, 2001, p. 250), learning is inherently the transformation of the self. Learners integrate what they know and are able to do with who they are becoming in a process of developing ways of being within a broad range of professional practices (Dall'Alba, 2005; Dall'Alba & Barnacle, 2007). In order to facilitate this type of learning, higher education programs need to "incorporate not only

epistemology - what students need to know and be able to do - but also ontology - who they are becoming" (Vu & Dall'Alba, 2011, p. 96).

In other words, an ontological turn for higher education is deemed vital for higher education to move forward in a changing world (Barnett, 2004; Dall'Alba & Barnacle, 2007). Through education, students learn to develop their ways of being and inhabiting the world with other people and things. It follows that there needs to be a shift in focus from the development of a particular curriculum or type of professionals to the development of the whole person by means of education that emphasises who we are becoming. To put it in Gloria Dall'Alba's words (2009): "knowledge and skills are gained in order to contribute to this process of becoming; epistemology is in the service of ontology" (p. 54).

In line with an ontological turn for higher education, assessment should assess, at the same time promote the extent to which students integrate what they know and how they act with who they are becoming (Vu & Dall'Alba, in press). A way forward for assessment is to move beyond students simply demonstrating their learning through the assessment task to create opportunities for them to learn from the task (Boud, 2009; Gibbs, 2006; Norton, 2004). Assessment with an ontological focus encourages and supports students to synthesise what it means to be skilful and reflect on ways of knowing, acting and being in a way that extend their possibilities for becoming who they endeavour to be. Assessment should be seen as complex processes of multiple activities and procedures that encompass academic, social and interpersonal aspects. Through accomplishing an assessment task, students develop the capacities for critically interrogating the knowledge and skills they seek, the professional activities they practise and the way they are to be towards people and things they encounter. In this way, assessment is not an end in itself but, rather, engages students in processes where they learn to take up and respond to the question of who they are becoming while seeking to be skilful for their designated professional practices.

In this conceptual paper, I will explore ways in which assessment can be designed to promote the integration of ontology into higher education programs for learning enhancement. Assessment is the area of interest, for firstly, assessment has potential impact on student learning (Biggs, 2003; Brown with Bull & Pendlebury, 1997; Gibbs, 2006) and secondly, assessment has been identified as an area of pressing need for further research (Bamber, Trowler, Saunders & Knight, 2009; Boud & Falchikov, 2007; Bryan & Clegg, 2006; Price, Carroll, O'Donovan & Rust, 2011). Building on recent developments in the research literature on assessment and ontological education, I will identify features of assessment that supports student learning while placing a heightened emphasis on ontology. I will then continue to draw on an empirical study and relevant research literature to propose how such assessment can be designed, together with appropriate strategies.

Features of assessment with an ontological focus for enhancing student learning

A number of recent studies have drawn on the research literature to establish theories of 'good assessment practice' for enhancing student learning. More specifically, David Boud and colleagues raised seven propositions for assessment reform in higher education (Boud et al., 2010); Graham Gibbs and colleagues put forwards conditions under which assessment supports student learning (Gibbs & Simpson, 2004-5); Gordon Joughin and colleagues promoted principles of learning-oriented assessment (Carless et al., 2006); Margaret Price and colleagues synthesised the premises for good assessment practice (Price et al., 2011). On a general note, an assessment practice that is beneficial for student learning ensures the linkage between assessment and learning activities, the spread and frequency of assessment, engagement of students in the assessment processes, clarity of assessment, and quality of feedback to feed forward learning.

This paper will build on these developments in identifying features of assessment for learning with an ontological focus. Such assessment needs to be: (a) authentic; (b) engaging; and (c) supportive.

First of all, in order for students to learn to develop their ways of being and inhabiting the world with other people and things through assessment, it has to be authentic. Assessment tasks should sample real-world activities in realistic contexts (Darling-Hammond & Snyder, 2000; Herrington & Herrington, 2005; Wiggins, 1989), providing students with opportunities to collaborate with relevant people and their peers. Through accomplishing assessment tasks, students are required to demonstrate

how their performance has been informed by their learning (Ridley & Stern, 1998), including justifying the significance of this performance in light of who they are becoming. Involvement in such assessment practices can provide students with opportunities to synthesise and demonstrate what it means to be informed and skilful. Assessment can direct students to developing ways of being who they are becoming and focus their learning on these processes. In this way, assessment is not an end in itself but rather, educational processes that engage students in learning to become who they endeavour to be.

This points to the second feature of assessment with an ontological focus, which is relevant to all types of assessment for student learning more generally; it has to be engaging. Given the high stake status of assessment where student performance is graded and certified (Price et al., 2011; Sadler, 2005, 2009), a balance needs to be achieved between assessing and enhancing student learning. Assessment can assess, at the same time enhance student learning through engaging them in the assessment processes. The research literature emphasises a number of conditions for engaging students. First of all, assessment needs to be meaningful to students where they can see its relevance to their life and future, and hence are motivated to immerse themselves in the experiences to which they are exposed. Assessment needs to provide space and opportunities for students to learn from the assessment, rather than simply requiring them to demonstrate their learning (Boud, 2009; Gibbs, 2006; Knight, 2006; Norton, 2004). To encourage students to engage with the assessment and take up the opportunities to learn, assessment details such as objectives, requirements and procedures need to be made clear to students (Banta & Associates, 2002; Banta, Jones & Black, 2009; Gardner, 2006; Gibbs, 2006b; Meyers & Nulty, 2009; Price et al., 2011). Adequate preparation for students, including making these points clear, has also been demonstrated to be critical in enhancing learning from assessment for personal and professional development (Meyers & Nulty, 2009; Vu & Dall'Alba, 2007).

Engagement of students in learning opportunities from the assessment highlights the role of the teacher. The teacher has to make sure students are appropriately supported throughout the assessment processes. The need to design and implement assessment so that it is supportive of student learning is particularly relevant when learning to become who students endeavour to be can be expected to be challenging to students. One major challenge may be associated with the fact that students are required to seek ways of being who they are not yet to be. Students may find disoriented within new practice worlds and the possibilities that are opened up to them (Vu & Dall'Alba, in press). This challenge highlights the need to scaffold their learning through the design of the assessment. Assessment can build on public knowledge and usual ways of operating in the practice worlds whilst also requiring students to reflect on their ways of knowing, acting and being. Through promoting reflexivity, assessment can contribute to increasing awareness of, and provide a focus for, students seeking possibilities for ways of being who they endeavour to be.

In terms of implementing assessment, the teacher has to be available to provide support, supervision, and direction for student learning. In particular, the teacher needs to provide a fear-reduced and supportive environment. In this environment, students can be encouraged to interrogate the knowledge and skills they seek, the professional activities they practise and thereby, develop their own ways of knowing, acting and being.

Timely support and assistance can also be provided through promoting discursive interactions among students, and between students and teacher in the assessment processes. Discursive interactions facilitate mutual understanding and trust among students, paving the way for collaborative learning with, and from, peers. During interactions, students can form their own ways of acting and being by differentiating what are, and what are not, genuinely theirs. Interactions can also allow for meaningful feedback both from peers and from the teacher that can be used to support current and future learning. In order for students to learn from interactions and resolve potential conflicts and tension, teachers should sensitively handle discussions surrounding these interactions to focus student learning (Vu & Dall'Alba, 2007).

I have drawn on research on good assessment practices to synthesise features of assessment for student learning with an ontological focus. In order to promote student learning to integrate what they know and are able to do with who they are becoming, assessment has to build on real-world activities in realistic context, engage students in learning from the assessment and carefully scaffold their learning. Designing assessment in this direction can be achieved through integrating assessment with real-world practice, assessment with learning, and the summative with formative purposes of

assessment.

Integrating assessment with real-world practice

Integrating assessment with real-world practice demands an understanding of what practice is and from there, how integration can be achieved in concrete ways. We often think of practice (in professional practice) as professionals practising their occupation. In this sense, practice refers to everyday activities and the conduct of those activities. However, professionals do not randomly carry out an activity in a vacuum. They do it with a purpose, in the web of interrelationships with people and things who, together with the professionals, form the occupation. For instance, the teaching practice may involve delivering a lecture to, and interacting with, our students according to a meaningful schedule, using our teaching tools, in our educational institution. Teachers, students, teaching material and tools, the educational institution, to name just a few, altogether form the teaching occupation.
In this direction, Franziska Trede & Megan Smith (2012) proposed:

> Practice can be conceived as purposeful action that results in products and productivity, as mindful and engaged critical dialogues with others…, and as shaped and shaping historical, social and political dimensions of the workplace and society at large" (p. 188).

This definition shows that practice consists of three interrelated aspects; action and activities, interactions with people things, and the contexts where such actions, activities and interactions occur. While this definition seems to overlook the embodied and agential constituent of practice - ways of knowing, thinking, acting and being (Higgs, 2012), it can inform us of how assessment can be integrated with real-world practice. In order to integrate assessment with real-world practice, the teacher can identify essential activities of the designated professional practice, the network of people and things involved in the activities and a concrete context for carrying out the activities. The teacher can then use the information to design the assessment task and articulate assessment requirements.
In line with the interrelated aspects of the professional practice, an assessment task should require students to perform one or more essential activities of the profession to the standards, under the conditions, and in the manners one would expect from professionals. These requirements would also include students collaborating with relevant people whether they are team members, clients or other stakeholders and reflecting on their thinking, acting and being as they are being immersed in practising the activities. Being designed in this way, assessment can allow students to learn to practise in an authentic way. Assessment can help to make evident to students what it means to be skilful, and from these departures, encourage them to develop their own ways of being and acting. In order to focus and support student learning in this direction, assessment should also be designed to integrate with the learning that they are engaged in.

Integrating assessment with learning

Traditionally, assessment and learning has been connected through John Biggs' famous constructive alignment. Biggs (1998, 2003) devised a model of three components, namely: intended learning outcomes, teaching/learning activities, and assessment tasks. The constructive alignment among these components is achieved when the intended learning outcomes are expressed clearly, the teaching/learning activities are designed to facilitate the attaining of the outcomes, and the assessment tasks assess the extent to which these intended outcomes are attained by the students.

Undoubtedly, constructive alignment is a powerful model that contributes greatly to the integrity of curriculum development and makes students' learning experience more coherent and meaningful. However, this model seems to reinforce the long-existing illusion that learning and assessment are time-separated activities. Geoffrey Crisp (2010, p. 6) pointed out the danger of the illusion in that "this has led to a fragmented approach to setting assessment tasks and for students to feed from the breadcrumb trail of instructor comments". Furthermore, the model seems to emphasise the constructive alignment within a course, learning module or unit. Yet, student learning can benefit from not only alignment within a course but also the integrity of the whole program (for example, see Crisp, 2010; Leathwood, 2005; Vu & Dall'Alba, 2007).

Drawing on the work of Biggs, John Cowan (2007) proposed a move beyond constructive alignment to integration. Assessment practices should be integrated with teaching and learning by using assessment tasks as learning tasks. This dual use of the same tasks can help to make the expected type of learning evident to students.

In the same vein with Cowan's proposal, Lin Norton (2004, p. 689) advocated the integration of assessment criteria with intended learning outcomes. This integration is to eliminate the adverse impact of assessment on learning that students "may take a strategic approach and end up focusing on the superficial aspects of their assessment tasks" in order to address the mechanics of the tasks (ibid, p. 689). Integrating the assessment criteria with intended learning outcomes, and restructuring learning activities accordingly can direct students' focus to learning what is intended (Biggs, 2003; Cowan, 2007) and scaffold their learning in that direction.

By making the learning evident to them and directing their focus to that learning through integration of assessment with learning, assessment is likely to promote learning in an effective way. Given some of the challenges of education with an ontological focus including students' unfamiliarity with the new practice worlds and the various possibilities for knowing, acting and being opening up to students, knowing clearly what to learn and how to learn, together with being assisted in learning is vital to students.

Assistance can be provided to students through timely and meaningful feedback as well as engagement with that feedback. Timely feedback provides students with a picture of their current learning and allows them to act on the feedback (Black & Wiliam, 1998, 2006; Crisp, 2010; Knight, 2006; Price et al., 2011). Meaningful feedback clarifies to students what good performance means (Nicol & Macfarlane-Dick, 2006), as well as their strengths, weaknesses and the quality of their work. However, according to Graham Gibbs (2006), what matters is "not the quality of feedback but the quality of student engagement with that feedback" (p. 27). Discussing feedback can engage students in sharing their understanding of the feedback, and use feedback to improve teaching and learning practices. In this way, when assessment is integrated with learning, feedback from the assessment is likely to feedforward future learning (Carless et al., 2010; Crisp, 2010; Knight, 2006; Lambert & Lines, 2000). The importance of feedback on supporting student learning highlights the need to integrate summative with formative purposes of assessment when designing assessment practices.

Integrating the summative with formative purposes of assessment

In the educational research literature, the formative and summative purposes of assessment are often referred to as a dichotomy (for example, see Crisp, 2010; Gibbs & Dunbar-Goddet, 2009; Irons, 2008; Knight, 2002; Price et al., 2011; Rowntree, 1987; Taras, 2008). Assessment with a formative purpose focuses on generating information that can be used for improving teaching and learning. Formative assessment can happen at the start, during, or at the conclusion of a learning unit or session. It aims to diagnose students' understanding so as to structure the teaching and learning that meets students' emerging needs (Rowntree, 1987); to prepare students for the session and engage them in learning; or to consolidate the learning and provide feedback to feedforward future learning (Lambert & Lines, 2000). Given formative assessment provides feedback to support teaching and learning, it is considered beneficial for teaching and learning (Black & Wiliam, 2006; Irons, 2008; Knight, 2002; Rowntree, 1987).

While formative assessment focuses on supporting on-going teaching and learning, assessment with a summative purpose focuses on valid and reliable measurement of student learning, often at culmination points of learning. Summative assessment purports to provide overall judgments, documents and reports on students' achievement for grading and certification purposes (Price et al., 2011; Sadler, 2005, 2009). As the term summative suggests, summative assessment aims to summarise students' learning and development via one or more assessment instruments. The level of students' learning and development is usually quantified in the form of a mark or grade, which then can form a foundation for certification processes. Given this, summative assessment has been demonstrated to capture students' attention and has 'backwash' effects on what and how students learn (Biggs, 2003;

Gibbs, 2006; Joughin, 2010).

While it is necessary to distinguish the formative and summative purposes of assessment, dichotomising these forms of assessment can be called into question. In the first place, assessment with a formative purpose is often developed by the teacher to support teaching and learning without awarding a grade. Despite its benefits to teaching and learning, the fact that it does not award a grade can adversely impact on students' commitment (Irons, 2008). When students' commitment to formative assessment is limited, teachers can find themselves less motivated to incorporate it in their teaching.

Summative assessment, despite being the driver of student learning, has been argued as having limited effects on learning enhancement (Boud & Falchikov, 2007; Pelligrino, Chudowsky & Glaser, 2001). Summative assessment tends to be scheduled into intervals in the course such as mid-semester and end of semester. This has been criticized as the cause of students' uneven distribution of time and effort invested in learning activities (Gibbs, 2006). A common timeline for summative assessment at mid-semester and end-of-semester may mean that students have to deal with too much assessment at a time, a likely cause to cripple their learning (Irons, 2008). Often happening at culmination points of learning, summative assessment is also limited in terms of opportunities to engage students in learning from the feedback (Brown, 1999).

However, assessment in higher education is a high-stakes practice (Crisp, 2010; Leathwood, 2005; Sadler, 2009). Students' achievement in a course or a program must be documented, reported, and certified for qualifications and progression, thus assessment with a summative purpose is inevitable. The high-stakes status of assessment can, indeed, motivate student learning. On this ground, Biggs (1998) proposed that a combination of 'backwash' (from a summative purpose of assessment) and feedback (from a formative purpose) is likely to exert positive effects. In other words, assessment tasks should be considered against both formative and summative purposes, as Crisp (2010) pointed out:

> These same formative and summative tasks must serve a multitude of purposes, ranging from identifying weaknesses in prior knowledge or skill levels (diagnostic assessment) to providing timely feedback to students on their development of new capabilities resulting from their current learning and finally to identifying strategies that will provide productive pathways to future learning. (p. 6)

Given the high-stakes status of assessment, integrating formative with summative assessment tasks can allow for assessing student learning to form a solid base for certification whilst striving to enhance this learning. Integration of this type can be achieved through the use of incremental, or progressive, assessment (Brown, 1999). In progressive assessment, one task feeds into another in a meaningful way. Through connecting assessment tasks, feedback from early assessments can inform student learning and performance in later assessments. In this way, learning can be emphasised over assessing. Students can be encouraged to be more open to learning to interrogate knowledge, skills, routine practices and the conduct of those practices, with timely feedback and assistance in doing so (Vu & Dall'Alba, 2010). On this basis, students can embark on a journey of asking who one is, searching for possibilities for being, and becoming who one endeavours to be.

I have drawn on the research literature to identify ways to integrate assessment to promote student learning to develop ways of knowing, doing and being as aspiring professionals. I now draw on an empirical case study to illustrate ways to achieve such integrations.

The case study

The case study (Ethical clearance ID number: 08020) was conducted in a third year compulsory course in the Bachelor of Engineering degree program in an Australian university; 'Project management and communication'. This course is project based, with students working in teams of six or seven on one of six real-world engineering projects sourced through academic staff members in partnership with the engineering industry. In the semester the study was taken, 170 students enrolled in the course. Classes were four hours per week over 13 weeks, including lectures, mentor meetings and student presentations. Fifty percent of class contact was devoted to student meetings with mentors. These mentors were the teaching staff who worked with each team on their progress, providing assistance and support as needed.

Assessment in the course included one Individual Presentation, three Group Project Reports, and one Individual Workbook, as shown in Table 1. While the Individual Presentation and the Project Reports were scheduled in accordance with the three milestones for the project: initial project scoping, mid-term progress and final design, the Workbook was kept throughout the project. Assessment resources in the course included the marking criteria and standards rubric, exemplars and hints to produce a good piece of work for each task. Additional resources, the templates, were provided for the three Reports.

Table 1: The assessment in the engineering course

Assessment tasks		Real-world engineering project		
		Project scoping	*Mid-term progress*	*Final design*
Individual Presentation	Due:	Week 5	Week 9	Week 13
design or project team management (each team member on a roster basis)	Weighting:		10%	
Team Project Reports	Due:	Week 5	Week 9	Week 13
design, project team management and reflections	Weighting:	10%	20%	40%
Individual Workbook	Due:		Week 13	
portfolio of activities and reflections	Weighting:		20%	

For the Presentation, each team member presented once during the semester on either the technical design or team management corresponding to each milestone, with their peers acting as both audience and assessors. Each individual presentation was precisely five minutes, with an additional five minutes for the whole team to respond to questions from the audience. Students assessed their peers using an assessment criteria and a marking rubric that were provided prior to the presentation sessions. The final mark for the Presentation was averaged from all the marks awarded by their peers and accounted for 10% of the overall course grade.

Following presentation sessions, the team had one week to work on their corresponding milestone report, which was submitted as a team. The three reports were: initial project scoping, due in week 5, weighted 10%; mid-term progress, due in week 9, weighted 20%; and final design, due in week 13, weighted 40%. The Reports comprised of three components, namely, technical design, team management, and a meta level of reflection about the management and communication processes the team had used as they worked on their project. Contribution to the team was assessed by peers and was embedded within the final mark each member received for each of the three Reports.

In the final assessment task, the Workbook, each student was required to record project activities, team progress, their contributions to the team and their personal reflections throughout the semester. The Workbook was checked up twice during the semester by a mentor, submitted for assessment at the end of the semester and weighted 20% in the overall course grade.

Assessment integrations in the case

Assessment in this case study was successfully integrated with the real-world engineering practice and the learning students were engaged in. The formative purpose of assessment was also integrated with the summative purpose to support student learning effectively.

First of all, integration of assessment with the real-world practice was achieved through incorporation of real-world, team-based projects. The assessment tasks in the course were built on essential activities underpinning these projects, including working in a team, writing a report, presenting the project, keeping a working portfolio and reflecting on the project processes. In working in a team, students were required to manage the team and operate effectively as team members to execute a technical

design. Writing a report and presenting the project required them to take their audience into consideration and prepare the reports and presentation accordingly. In keeping a working portfolio, they were asked to document processes of the project in detail and their reflections on these processes. Reflecting on the project processes required students to identify what worked, what did not and what from there.

Through integrating assessment with real-world practice, assessment in this course not only focused on what engineers needed to know and be able to do, but also on how engineers needed to interact with others and reflect on their practices. In this way, the assessment was used to capture students' accomplishment of essential engineering activities and highlighted to them what everyday engineering practice may entail. Assessment of this design is likely to raise students' awareness of what it means to be skilful for a designated profession, forming a platform for them to develop their ways of thinking, acting and being.

While assessment of this design can be expected to be beneficial for students in learning for their future, it can be challenging. Challenges may include unfamiliarity of students with the engineering practice required for the assessment and a demanding workload. In order to make the learning evident to students and support them in their learning, assessment was also integrated with learning.

Integration of assessment with learning was achieved by basing both the course content and assessment on the real-world, team-based projects. More specifically, the learning objectives corresponded to the project milestones. The lectures introduced students to concepts, methods, and techniques that they would need to apply in the context of their project in order to meet the milestones. The assessment tasks asked students to report their practices and reflect on the ways in which they met these milestones. Assessment resources including the templates, the exemplars, the assessment criteria and standards rubrics and the hints brought together lecture contents, assessment requirements and professional standards. Assessment tasks and resources contributed to making the learning and associated expectations evident. Students were pointed to what to do and how to do it in order to respond to the expectations of everyday engineering practice. In this way, the teaching and learning activities, as well as the assessment, were integrated into the learning that students were interested and engaged in; i.e. learning to practise as engineers.

To further support student learning, the formative purpose of the assessment was integrated with the summative in a strategic way. While each assessment task carried a weighting towards the overall course grade, weightings increased as the project progressed. This increasing weighting system allowed students to learn from trials and errors, at the same time motivated them to use feedback to direct their learning. In this course, not only students received detailed and regular feedback but also they had opportunities to discuss and act on the feedback. As noted earlier, 50% of class contact was allocated for mentors to meet with their teams to provide assistance, including feedback discussions. To make feedback relevant to their learning as the projects progressed, the assessment was designed in a way that early tasks fed into the later ones. This progressive design encouraged students to use feedback to improve their subsequent submissions, especially the three reports. Progressive assessment, together with the weighting system, ensured integration of formative with summative purpose of assessment.

Integrations of assessment in this course were powerful to student learning. When learning was emphasised over assessing, students were encouraged and supported to learn what they may not probably have done before, learning to practise engineering and to become aspiring engineers.

Conclusion

Interest in exploring ways to support student learning for a changing world has been intensifying in the current sweeping of curriculum review and renewals. Learning to integrate what students know and are able to do with who they are becoming within a broad range of practices has been promoted as appropriate for this goal. In this paper, I have synthesised from studies on assessment to argue that assessment can enhance this type of learning through being authentic, engaging and scaffolding. I have also drawn together relevant research to identify ways to design such assessment through integrating assessment with real-world practice, assessment with the learning students are engaged in, and the formative with summative purposes of assessment. In this way, assessment is not an end in itself but,

rather, an opportunity for students to learn to interrogate the knowledge and skills they seek, the professional activities they practise and the way they are to be towards people and things they encounter, in a way that extend their possibilities for being who they endeavour to be.

The features of assessment for student learning with an ontological focus, together with appropriate designing strategies, that are identified and synthesised in this paper could be a point of reference for further research into, and use of, assessment practices with the goal of promoting student learning for their future. In the meantime, it can be expected that the use of assessment in the ways proposed in the paper can be socially and academically challenging, which demands strong institutional support and commitment. Some of the challenges include possible resistance from some staff and/or students, who may prefer their usual ways of using assessment. There is likely to be an additional workload involved in adopting a new approach, and resulting re-structuring of teaching/learning practices. Hence, both teachers and students should be encouraged to be open to changes. They also need to be adequately trained and prepared for the use of new assessment practices (Boud, Cohen & Sampson, 2001; Brown & Glasner, 1999; Orpwood, 2001). These issues highlight the need to explore and evaluate ways in which assessment with an ontological focus can be used to enhance student learning as proposed in the paper, given the high-stakes status of assessment in the educational system.

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